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DEMAND FOR FORMAL CREDIT AMONG SMALL SCALE CASSAVA FARMERS IN KOGI STATE, NIGERIA: A DOUBLE HURDLE ANALYSIS

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ABSTRACT

In Nigeria, one of the major constraints to the decline in agriculture's contribution to the economy is inaccessibility to capital by small scale farmers. This study therefore examined the determinants of access and demand for formal credit by small scale cassava farmers in Okene, Okehi and Adavi Local Government Areas of Kogi State. Data were collected from 120 cassava farmers; descriptive and double hurdle model were used to analyse the data. The result of the analysis showed that the sampled farmers were young with an average of about one hectare of farm land. Majority of the farmers were literate and experienced in farming. The result from the first hurdle revealed that cassava farmers' access to formal credit was influenced by farm size, farming experience at 5% probability level and farm income at 1% probability level. On the other hand, farmers' age, level of education and cost of borrowing significantly influenced the amount of loan demanded at 1% probability level. Lack of collateral/guarantor, administrative bottleneck and unfriendly attitude of workers of the financial institutions with weighted mean of 3.47, 2.88 and 2.77 respectively were the major constraints to formal credit access and demand among cassava farmers. It was therefore recommended that cassava farmers should form viable cooperative societies to pull their resources together for easy access to formal credit. Financial institutions workers should be friendlier and simplify the processing and disbursement process of credit administration.

Key words: Determinants, capital, financial institutions

INTRODUCTION

The need for cash implies a need for credit, and as most small scale farmers need relatively small amounts of credit, microcredit and its potential for helping farmers grow have become the point of interest. Money for farming not only means access to credit, but also access to other financial products and services (Rooijakkers, 2010). Microcredit has significantly been adjudged as a catalyst for sustainable development of economic empowerment that target saver and provision of credit transaction for low income earners and under privileged groups (Hossain, 2003). Billions of dollars are spent every year on food aids, yet there are still more than one billion people suffering from hunger and children suffering from malnutrition (Jansen, 2010). In Nigeria, small scale farming (livestock and crop) has been the main farming feature. They are characteristically low-income earners concentrated in rural and less urban areas that have little or no access to modern management techniques. They maintain their soil fertility mainly with farm/domestic food wastes and no or low external inputs and fertilizers. Thus, they plant more food crop like cassava but with marginal income (Akimboye, 2010). Cassava is one of the most important crops in Nigeria, playing a dominant role in the rural economy in the southern agro-ecological zones and is increasingly gaining importance in other parts of Nigeria. As a food crop, cassava fits well into the farming systems of the smallholder farmers in Nigeria because it is available all year round, thus providing household food security. An estimated 70 million people obtain more than 500 kilo calories per day from cassava and more than 500 million people consume 100 Kcal per day (Kawano, 2003).

Currently, cassava root and leaves do not only serve as an essential source of calories but as a major source of income for rural households in Nigeria. Cassava provides food and income to over 30 million farmers and

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large numbers of processors and traders in Nigeria (Abdoulaye et al., 2014).This could be attributed to the cassava multiplication programmes in the country. However, ccassava has been a major staple crop and a key source of income to the rural dwellers in the State. In 2010, Kogi State accounted for 8% of the total cassava production in the country (NPFS, 2011). However, there is an emerging consensus on the fact that, to increase the level of food crops (cassava) production in the country, rural peasant farmers need to be strengthened financially, as microcredit has been cited as a major source in accelerating agriculture production. Implying that inadequate flow of credits into agriculture is a critical factor against incremental food production in Nigeria (Aihonsu, 2001).If small scale farmers are to have a role in meeting the increasing demand for food, they should also be provided with the means to do so. Access to credit would change the way small holder farmers see agriculture and the strategies they follow. This would enable them select better varieties, plant early and stick to sustainable practices (Ogunleye, 2000).However for any formal credit to be effective it does not only depend on its availability and accessibility but on the demand by the intended users.Therefore, this study examines the determinants of access and demand for formal credit among small scale cassava farmers in Kogi state.

MATERIALS AND METHODS

The study area

The study was conducted in three rural farming community of Kogi state, Nigeria. Kogi State lies between longitudes 7049IN and 6045IE; and latitudes 7.817IN and 6.750IE. It is bounded to the South by Anambra and Edo States; and to the North by Niger, Nassarawa and Federal Capital Territory; to the East by Benue and Enugu States. On the Western flank it shares a common border with Ondo, Ekiti and Kwara States and covers an area of 3180km2. Going by the 2006 population census, the state pooled a population of 3,278,487 representing 2.34% of the Nigerian population. Kogi state consists of twenty one (21) local government areas. (National Population Census, 2006; Kogi state Ministry of Information, 2010). The state has about 2 million hectares of cultivable land with only about 0.5 million hectares currently under cultivation (Kogi state Ministry of Information, 2010). Agriculture is the mainstay of the economy and the principal cash crops. There are many farm produce from the state notably cassava, cashews, groundnut, maize, yam, rice, coffee, melon and cocoa.

Sampling techniques

A multi stage purposive random sampling was used. The first stage involved the purposive selection of three (3) rural local government areas in Kogi state to form sampling frame of all cassava farmers in Kogi state for the study; these local government areas wereOkene, Okehi and Adavi. These were chosen because of the availability of formal credit institutions and predominant cassava farmers. Villages were selected randomly from each of the three local government areas and random probability proportional to size sampling technique was used to select fifty (50) cassava farmers from six (6) villages of Adavi local government area, then thirty five (35) cassava farmers from four (4) villages of Okene local government area, and thirty two (32) cassava farmers from four (4) villages of Okehi local government area; making up to a sample size of one hundred and twenty (120) cassava farmers from the three local government areas. The cassava farmers include users and non-users of formal credit scheme. The questionnaires were administered to sixty (60) users of formal credit and the rest sixty (60) to non-users.

Method of data collection

Primary data were used; primary data were the main source of data that was used for this analysis. Primary data were collected with questionnaire complemented with personal interview.

Method of data analysis

Data collected were analyzed with the use of statistical tools. The data were subjected to descriptive statistics such as frequency distribution tables, percentages and mean to identify the socio economic characteristics of the farmers and constraints faced by the cassava farmers. The Double Hurdle Model was used to determine the factors that affect demand for and level of loan obtained. According to double hurdle model formulated by Cragg (1971) and adopted by Akpan*et al.* (2013) assumes that the farmer (or households) makes two decisions concerning borrowing. Each decision stage is determined by a different set of factors. The behavioural content of this model has two separate hurdles which must be passed before a positive loan size can be obtained. The first hurdle involves decision about whether or not to access formal credit (participation decision). The second hurdle concerns on the level of loan obtained by the farmer that may be affected by various

factors related to the farm as well as financial institution's characteristics. The two decisions can be regressed as dependent on or independent of each other. The two-step method includes the estimation of a Probit model for selection, followed by the addition of correction factor which is the inverse Mills ratio obtained from the Probit model, into the second ordinary least square model of interest (Gujarati and Porter, 2009). According to Lee and Maddala (1985), the two decisions can be modelled as sequential. Following Jones (1989) and Pudney (1989), the double hurdle model can be specified as follows:

Observed loan size: Y - d.Y** (1)
Loan participation: W - α'Z + u (u ϵ N(0,1))

d - 1 if W > 0 and 0 otherwise. (2)
Loan size equation: Y* - β'X + v (v ϵ N(0, δ2) (3)
Y** - Y* if Y* > 0 and 0 otherwise.

where W is defined whether the household head decide to take formal credit, Y* is latent variable showing farmers' loan amount obtained, Y is the observed dependent variables (the amount of money the farmer obtained), Z is a vector of variables explaining the credit participation decision, X is a vector of variables determining on the credit amount, u and v are the corresponding error terms assumed to be independent and distributed as u ϵ N(0,1) and v ϵN(0,δ2). The independence of the error terms is a common assumption in these types of models (Jensen and Yen, 1996; Su and Yen, 1996). Assuming that the error terms u and v are independent, the model can be assigned to follow Cragg model in which zero loan amount has subscript p, positive loan amount is shown by a subscript +.

L - Π0 [1 – p(v>- αZ) p(u> - βX)] Π+p(u>- βX)f(y|u>- βX)

The Cragg model is a two-step approach with a Probit model for probability of participation in the first stage and truncated normal regression in the second stage. An alternative assumption is to hypothesize that the error terms of the participation and loan amount equations are correlated, and that the participation decision dominates the loan amount equation. Jones (1989) refers to this case as a first hurdle dominance. The model implies that observed zero loan amounts are the result of participation decisions only and that once the first hurdle is passed censoring is no longer appropriate. This suggests that only individual farmers with positive loan amount are included in the loan amount equation. The farmers' characteristics are also assumed to influence the size of the loan that the farmer takes. Under the condition that *Zi*= 1, *Yi* represents the log of the loan size expectedly received by each farmer, with the assumption that:

Yi=biXi+ vi.....(4)

where *Xi* is a vector of the variables that determines the loan size. In equations (3) and (4), ui and vi have bivariate normal distributions with zero means, standard deviation δu and δv, and they are correlated with correlation coefficient *ρ*. It is assumed that Zi and Li are observed for a random sample of individual farmers, but Yi is observed only when Zi=1, that is, when the rural farmer i has access to formal credit. Following the equation used by Mahmud (2015), the expected loan size may be written as follows:
(5)

$$E(Y_i \backslash Z_i=1)=E(Y_i \backslash Z_i^*>0)=E(Y_i \backslash U_i>-a_iL_i)=b_iX_i+E(V_i \backslash U_i>-a_iL_i)$$

$$=b_iX_i+\beta\sigma_{v_i}\mu_i(\alpha_u)$$

. Where

$$\mu_i(\alpha_u)=\frac{\varphi(\alpha_u)}{1-\phi(\alpha_u)}=\frac{\varphi(-\alpha_u)}{\phi(\alpha_u)}=\frac{\varphi(a_iL_i \backslash \alpha_u)}{(a_iL_i \backslash \alpha_u)}$$

..... (6)

And ϕ and φ are the normal density function and normal distribution function, respectively. The function $\mu_i(\alpha u)$ is called the inverse Mill's ratio. A least square regression of Yi on Xi, without the term $\mu_i(\alpha u)$, would yield inconsistent estimators of bi. If the expected value of the error was known, it could be included in the regression as an extra explanatory variable, removing that part of the error correlated with the explanatory variables and avoiding inconsistency.
The model is explicitly specified as;

$$Log \quad (L) \quad = \sum_0 in\left[1-\phi(z_i^{'}\propto)\phi\left(\frac{x_i^{'}\beta}{\delta}\right)\right]+\sum_+ in\left[\phi(z_i^{'}\propto)\frac{1}{\delta}\phi\left(\frac{y-x_i^{'}\beta}{\delta}\right)\right]$$

where

Log (L) -Loan size (₦) X_1 - age of the armer years) X_2 - farm size (hectares) X_3 - Household size (No.) X_4 - educationallevel (Years) X_5 - cost of borrowing (Naira)

X_6 - farm income of the respondent in 2015 (Naira)

X_7 - non- farm income (Naira)

X_8 - distance to credit institution (Km)

X_9 - cost of labour (Naira)

Yi - whether farmers access to credit (takes the value of 1 if the farmers take credit, 0 for otherwise). Z and *X* - is the vector of farmers characteristics B and α - is the vector of parameters μ and ε - the error term N (0, 1)

RESULTS AND DISCUSSION

The summary statistics of some important socio-economic characteristics of sampled cassava farmers are presented in Table1. The mean age of farmers in the study area was about 36 years. This suggests that majority of the sampled farmers are young and still very active to carry out farming operations; which is in contrast with the notion that rural farmers in Nigeria are aged. It also indicates that access to formal credit by this age group will have a positive impact on their productivity. The result also shows that the mean farm size to be 0.86 hectare while the maximum was 2 hectares. This is an indication that they are all small scale cassava farmers. The mean household size of 4 implies that most farmers have less access to family labour which could be responsible for the relative small farm size of the farmers. The average number of years spent in formal schooling was ten (10), this means that majority of the farmers were literate. Further analysis from Table 1 showed that the average farm income (₦222, 359.50) was far more than that from non-farm income (₦45, 225.83). This means that farming was the major source of income of the respondents. Table 2 shows the VIF test result for collinearity of the variables used with respect to the dependent variables. The result reveals that there was no significant collinearity between the specified explanatory variables and the dependent variables, this shows that the estimates of the models to an appreciable extent are consistent and probably unbiased.

Determinants of credit access among small-scale cassava farmers

The probit regression result on the determinants of formal credit access among small scale cassava farmers is as presented on Table3. The result shows that the coefficient of the likelihood ratio chi-square was 86.75 and significant at 1 percent, an indication of good fit for the estimated model. Farm size, farming experience and farm income had a positive influence on the probability of accessing formal credit among small-scale cassava farmers while household size have a negative effect on credit access. The positive sign of the significant variables implies that access to credit will likely increase with farm size, farming experience and farm income among small scale cassava farmers. This result is contrary to the findings of Etonihu *et al.* (2013) in which they found out that farm size and farming experience were not significant determinants of farmers' access to formal credit in Nassarawa state. However, the positive relationship of access to credit and farm income is in line with the findings of Omonona *et al.* (2008), in which they reported that farm credit is an important factor in the adoption of farm technologies and increased farm incomes among rural farmers in Oyo state, Nigeria. The negative sign of the significant household size shows that access to credit decreases with increased household size.

Factors affecting demand for loan

The semi-log was chosen as the best fit due to the fact that it has the highest number of significant variables with an adjusted R2 of 0.91 that is 91% of the adjustment in the model cause changes in the dependent variable.

Table 1: Summary statistics of socio-economic characteristics of cassava farmers

Variables	Mean	Standard Deviation	Minimum	Maximum
Age	35.98	8.13	20	70
Farm size	0.86	0.32	0.2	2
Household size	4.25	2.02	1	10
Education	10.44	4.38	3	16
Farming experience	17.39	7.67	6	47
Farm income	222359.5	139550.8	32400	540000
Non-farm income	45225.83	18473.99	10000	95000

Source: Field Survey, 2015

Table 2: Multicollinearity test

Variables	VIF	1/VIF
Farm size	4.40	0.227
Household size	4.17	0.239
Age	3.53	0.283
Distance	2.91	0.343
Cost of labour	2.83	0.352
Cost of borrowing	2.23	0.447
Non-farm income	2.17	0.461
Educational level	1.87	0.534
Farm income	1.66	0.603

Table 3: Determinants of formal credit access among small scale cassava farmers.

Variables	Coefficients	Z	P>/Z/
Constant	-7.627 (2.284)	-3.34	0.001***
Age	0.042(0.041)	1.02	0.306
Farm size	4.847(2.128)	2.28	0.023**
Household size	-1.174(0.261)	-4.49	0.000***
Education	0.046(0.095)	0.09	0.627
Farming experience	0.087(0.039)	2.22	0.027**
Farming Income	0.000(0.000)	3.37	0.001***
Non-farming Income	0.000(0.000)	1.08	0.279
LR ch2(7) =86.75Prob>chi2= 0.000Pseudo R2=0.5215Log likelihood = -39.804			
Source:Field Survey, 2015			

Significant at 1 percent***, significant at 5 percent**

Table 4: Factors affecting level of loan obtained

Variables	Linear	Semi-log	Double log	Exponential
Constant	80261.62 (3.35)***	-1159 (-6.51)***	4.627 (5.95)***	11.379 (69.51)***
Age (X1)	-487.03 (-0.81)	-76144.83 (-2.72)***	-0.182 (-1.49)	-0.0003 (-0.08)
Farm size (X2)	3405.55 (0.24)	3258.27 (0.20)	0.062 (0.87)	0.047 (0.50)
Household size (X3)	-3401.103 (-0.80)	11550.73 (0.67)	-0.041 (-0.55)	-0.0281 (-0.97)
Educational level(X4)	-1702.133 (-1.72)*	-23548.93 (-3.13)***	-0.060 (-1.85)*	-0.003 (-0.56)
Cost of borrowing (X5)	3.697 (17.63)***	145654.6 (17.13)***	0.674 (18.16)***	0.0000 (0.000)***
Farm income (X6)	0.032 (1.08)	-1717.33 -0.29	0.0343 (1.31)	3.79e-07 1.86)**
Non-farm income (X7)	0.190 (0.90)	16389.34 (1.56)	0.0955 (2.08)**	6.26e-07 (0.44)
Distance (X8)	-767.80 (-0.69)	-11861.04 (-1.92)	0.0156 (0.58)	0.004 (0.65)
Cost of labour (X9)	2.815 (1.69)*	4115.59 (1.24)	-0.0065 (-0.45)	0.0000 (1.33)
	R2 =0.93	R2=0.92	R2=0.94	R2=0.88
	R-2 =0.80	R-2=0.75	R-2=0.74	R-2=0.77

t- values are in parenthesis; ***; ** and * -1%, 5% and 10% level of probability respectively.

Table 5: Constraints to formal credit demand among cassava farmers

	SA		A		NS		D		SA		WS	WM	RMK
CONSTRAINTS	Freq	%	freq	%	freq	%	freq	%	freq	%			
Untimely delivery	4	6.7	55	97.1	1	1.7	0	0	0	0	117	1.95	Low
High interest rate	39	65	18	30	1	1.7	1	1.7	1	1.7	87	1.45	Low
Insufficient loan approval	1	1.7	53	88.3	4	6.7	0	0	2	3.3	129	2.15	High
Administrative bottlenecks	1	1.7	32	53.3	7	11.7	18	30	2	3.3	168	2.8	High
Unfriendly attitude of workers	1	1.7	32	53.3	7	11.7	20	33.3	0	0	166	2.77	High
High cost of processing loan	13	21.7	42	70	5	8.3	0	0	0	0	112	1.87	Low
Lack of collateral or guarantor	7	11.7	4	6.7	3	5	46	76.7	0	0	208	3.47	High

Source: Field Survey, 2015. Cut off score: > 2.0(High); < 2.0(Low) SA - Strongly Agree, A - Agree, NS - Not Sure, D - Disagree, SD - Strongly Disagree, WS - Weighted Score, WM - Weighted Mean, RMK - Remarks, Frq - Frequency, % - Percentage
Source: Field survey; 2015.

Table 4 shows that farmer's age, level of education, cost of borrowing and distance to financial institution determine the level of loan obtained by the cassava farmers at 0.001 level of significant. Further analysis revealed that only cost of borrowing had a positive relationship with level of loan obtained; this implies that as the amount borrowed increases, the cost of borrowing also increases in line with a priori expectations. Farmers' age was significant and negatively related. This implies that the older the farmer, the less the probability of demanding for formal credit. This finding agrees with that of Amao, (2013).The negative relationship of level of education with demand for formal credit was against prior expectations and the findings of Akpan *et al*. (2013). The reasons for these might be due to the fact that majority of the farmers had just above primary education, while farmers are only required to visit the bank once in a while especially during the production season when their attention might be required.

Constraints to formal credit access among small scale cassava farmers

The constraints to formal credit accessibility among small scale cassava farmers are presented in Table 5. The major constraints were lack of collateral or guarantor, admini strative bottleneck and unfriendly attitude of workers with weighted mean of 3.47, 2.80 and 2.77 respectively. These results is in line with the findings of Etonihu *et al* .(2013) in which the lack of bank accounts, collateral and information regarding the procedure for

accessing credit from bank limit rural farmers' access to formal credit. Administrative bureaucracy often time affect farmers interest in accessing agricultural credit as reported by Ekwereand Edem, (2014).

CONCLUSION AND RECOMMENDATIONS

The study concluded that farmers' age, level of education, cost of borrowing and distance to financial institution were the factors that significantly influence the amount of loan demanded by cassava farmers in the study area. It was therefore recommended that cassava farmers should form viable cooperative societies to pull their resources together for easy access to formal credit. Financial institutions workers should be friendlier and simplify the processing and disbursement processes of credit administration.

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